Chemistry 129.01

Name: _____ Key _____
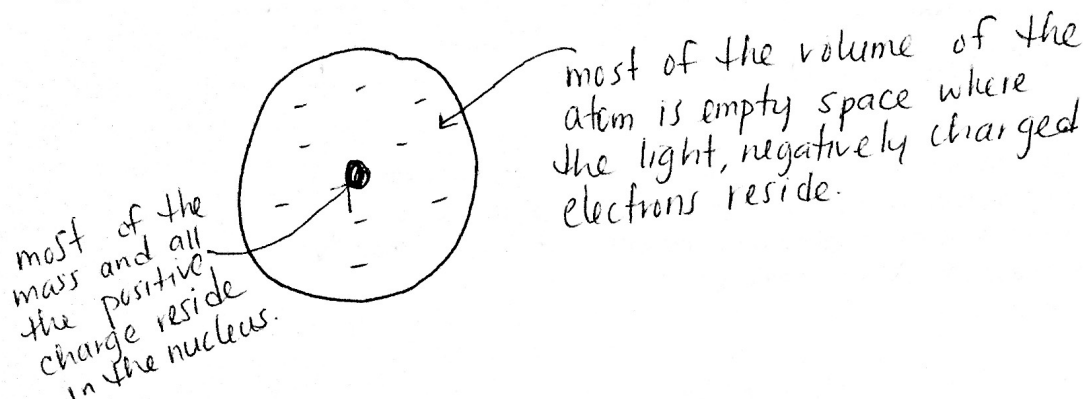
Show all your work!

1. (4 pts.) Based on the experiments performed by <u>Thomson, Millikan and Rutherford</u>, what does an atom look like?

most of the volume of the atom is empty space where the light, negatively charged electrons reside.

most of the mass and all the positive charge reside in the nucleus.

2. (7 pts) Fill in the gaps in the following table.

Name	Formula
sodium hydrogen carbonate	$NaHCO_3$
tin (IV) chloride	$SnCl_4$
nitric acid	HNO_3
dichlorine monoxide	Cl_2O
nitrogen dioxide	NO_2
iron (III) nitrite	$Fe(NO_2)_3$
ammonium acetate	$NH_4C_2H_3O_2$
hydrosulfuric acid	H_2S
copper (II) chloride	$CuCl_2$
aluminum sulfate	$Al_2(SO_4)_3$
lithium hydroxide	$LiOH$
potassium permanganate	$KMnO_4$

3. (4 pts.) Fill in the gaps in the following table. Each column may represent a <u>neutral atom or an ion</u>.

Symbol	$^{197}_{79}Au^{3+}$	$^{40}_{18}Ar$	$^{58}_{28}Ni^{2+}$
Protons	79	18	28
Neutrons	118	22	30
Electrons	76	18	26
Atomic Number	79	18	28
Mass Number	197	40	58
Charge	+3	0	+2

4. (10 pts) A hydrogen atom undergoes an electron transition from **n=1 to n=3**.
   (a) Does this transition correspond to absorption or emission of energy?
   (b) Determine the wavelength of light associated with this transition. Identify the region of the electromagnetic spectrum to which it belongs.
   (c) Determine the energy in kJ/mol.

(a) $n=1 \rightarrow n=3$ Absorption

(b) $\Delta E = -2.18 \times 10^{-18} J \left(\frac{1}{3^2} - \frac{1}{1^2} \right) = 1.94 \times 10^{-18} J$

$\lambda = \frac{(6.626 \times 10^{-34} J \cdot s)(3.00 \times 10^{+8} m/s)}{1.94 \times 10^{-18} J} = 1.03 \times 10^{-7} m$

$= 103\ nm$

Ultraviolet Region

(c) $1.94 \times 10^{-18} J \left(\frac{1\ kJ}{1000\ J} \right) \left(\frac{6.022 \times 10^{23}}{mol} \right) = 1,170 \frac{kJ}{mol}$